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Montana. Hard Rock Bureau
TVX Mineral Hill Mine Inc., exploration license no. 00559, Crevice Tunnel

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ENVIRONMENTAL ASSESSMENT

TVX MINERAL HILL MINE INC.
EXPLORATION LICENSE NO. 00559

CREVICE TUNNEL EXPLORATION PROJECT

PARK COUNTY, MONTANA

Prepared by:

MONTANA DEPARTMENT OF STATE LANDS
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Pursuant to:

THE MONTANA ENVIRONMENTAL POLICY ACT
Title 75, Chapter 1 et seq. MCA

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ENVIRONMENTAL ASSESSMENT

APPLICANT: TVX Mineral Hill Mine Inc. **LICENSE NO.:** 00559

TYPE OF OPERATION: Exploration **DATE OF APPLICATION:** 22 July 1994

PROJECT: Crevice Tunnel **COUNTY:** Park

PERSON(S) PREPARING EA: Prepared and compiled by Scott D. Spano, with the technical review and assistance of staff specialists from the Department of State Lands' Hard Rock Bureau, the Department of Health & Environmental Sciences' Water Quality Bureau, and the U.S. Forest Service - Gallatin National Forest.

APPLICATION COMPLETE: 15 August 1994 **EA COMPLETE:** 17-22 August 1994

				POTENTIAL IMPACTS		
	A	B	C	LONG TERM	SHORT TERM	AMPLIFICATION
PHYSICAL ENVIRONMENT						
1. TOPOGRAPHY		X			X	Disturbed area would be recontoured - please see expanded reclamation discussion, Section 6.0.
2. GEOLOGY; Stability			X			Please see expanded discussion of stability & subsidence, Section 7.9.
3. SOILS; Quality, Distribution		X			X	Soils would be salvaged and replaced - please see expanded reclamation discussion, Section 6.0.
4. WATER; Quality; Quantity; Distribution			X			Please see expanded water discussions, Sections 5.0 & 7.2.
5. AIR; Quality			X			Please see expanded air quality discussion, Section 7.1.

				POTENTIAL IMPACTS		
	A	B	C	LONG TERM	SHORT TERM	AMPLIFICATION
6. UNIQUE, ENDANGERED, FRAGILE, or LIMITED environmental resources			X			
BIOLOGICAL ENVIRONMENT						
1. TERRESTRIAL, AVIAN, and AQUATIC; species and habitats			X			Please see expanded wildlife discussion, Section 7.8.
2. VEGETATION; quantity, quality, species		X			X	Disturbed areas would be revegetated with native seed mixture - please see expanded reclamation discussion, Section 6.0.
3. AGRICULTURE; grazing, crops production			X			
HUMAN ENVIRONMENT						
1. SOCIAL; structures and mores			X			
2. CULTURAL uniqueness, diversity			X			
3. POPULATION; quantity and diversity			X			
4. HOUSING; quantity and distribution			X			Please see expanded discussion, Section 7.7.
5. HUMAN HEALTH & SAFETY			X			
6. COMMUNITY & PERSONAL INCOME			X			Positive, short-term impact on community income - please see expanded discussion, Section 7.7.
7. EMPLOYMENT; quantity and distribution			X			Positive, short-term impact on area employment - please see expanded discussion, Section 7.7.
8. TAX BASE; local and state tax revenue			X			Minor, short-term positive impact on local & state revenue - please see expanded discussion, Section 7.7.

				POTENTIAL IMPACTS		
	A	B	C	LONG TERM	SHORT TERM	AMPLIFICATION
9. GOVERNMENT SERVICES; demand			X			
10. INDUSTRIAL, COMMERCIAL and AGRICULTURAL activities			X			
11. HISTORICAL and ARCHAEOLOGICAL			X			Would avoid historic/cultural structures.
12. AESTHETICS		X			X	Area would be fully reclaimed - please see expanded discussion, Section 6.0.
13. ENVIRONMENTAL PLANS and GOALS; local and regional			X			
14. DEMANDS on ENVIRONMENTAL RESOURCES of land, water, air and energy			X			
15. TRANSPORTATION; networks and traffic flows			X			Please see expanded discussions, Sections 1.0, 7.5 & 8.0.

PUBLIC INVOLVEMENT: Since the mid-1980s, when the Mineral Hill Mine was originally permitted, the public has been kept informed regarding all mining & exploration activities through public notices and regularly-scheduled meetings between representatives of Mineral Hill and the Gardiner Citizens' Advisory Committee (CAC). The most recent public meeting with the CAC specifically regarding this proposal was held at the Best Western Mammoth Hot Springs Inn in Gardiner on Thursday evening, 18 August 1994 at 7:00 PM.

ALTERNATIVES CONSIDERED: Please see expanded discussion, Section 8.0.

CUMULATIVE EFFECTS: Strictly in terms of exploration disturbances and impacts, approval of this proposal would not lead to any cumulative effects to any resources, as most of MHM's surface exploration sites have been fully and adequately reclaimed. However, as discussed below, the tunnel would provide access to the target ore zone at its lower limit, as determined by current surface drilling, and would provide footing for underground diamond drilling, bulk ore sampling, and possible subsequent mine development. No mining plans exist at the present time; the proposed Crevice Tunnel is one component of an exploration program intended to determine the continuity of the potential ore body and to attempt to delineate an economic ore reserve in the Crevice Mountain area.

However, the argument could be reasonably made that this underground access to the target ore zone "opens the door" to future mineral development. The September 1985 Draft EIS and April 1986 Final EIS, which were written for the present-day Mineral Hill Mine facility, discuss the impacts of the facility with a then-projected lifespan of 20 years. Although ore reserves at that time only dictated a lifespan of less than half that amount of time (~7 years), the company felt that ongoing exploration during mining would add to the mine life by at least another 6-10 years. As such, the mine's various facilities (e.g. the tailing impoundment, mill, etc.) were sized and analyzed for the longer, projected mine life. In addition to this fact, the Mineral Hill ore deposit is within about 1 to 2 years of being mined out, and should the Crevice ore target prove to be economically minable, it could be mined with the current mine work force with few, if

any, additional permanent employees. Because of these facts, if development of this satellite ore body were to occur, the impacts of that development would likely be as discussed in those original EIS documents. In any event, if a minable reserve is identified at Crevice, TVX Mineral Hill Mine would be required to apply to DSL for an amendment to Operating Permit No. 00100 prior to commencing full-scale mining, addressing all issues pertinent to commissioning a satellite ore body.

COMPLIANCE STATUS: Exploration License No. 00559 is in full compliance.

RECOMMENDATIONS CONCERNING PREPARATION OF AN EIS: Not necessary at this level of disturbance, since there are no significant adverse environmental impacts.

OTHER GROUPS OR AGENCIES CONTACTED OR WHICH MAY HAVE OVERLAPPING JURISDICTION: Montana Department of Health & Environmental Sciences - Water Quality Bureau & Air Quality Bureau; U.S. Forest Service - Gallatin National Forest

INDIVIDUALS OR GROUPS CONTRIBUTING TO THIS EA: Prepared and compiled by Scott D. Spano, with the technical review and assistance of staff specialists from the Department of State Lands' Hard Rock Bureau, the Department of Health & Environmental Sciences' Water Quality Bureau, and the U.S. Forest Service - Gallatin National Forest.

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EXPANDED DISCUSSIONS

1.0 INTRODUCTION

TVX Mineral Hill Mine, Inc. (MHM) has, for several years, conducted exploration drilling in the Crevice Mountain area in southern Park County, Montana. On 22 July 1994, MHM submitted a plan of operations to the Montana Department of State Lands (DSL) that outlines a proposed exploration program to access the mineralized zone at Crevice via an underground tunnel from Mineral Hill to the Conrad Zone (the name of the ore target) in the Crevice Mountain area. That application was considered complete by DSL on 15 August 1994, following review by its technical staff, and the staff of other cooperating state and federal agencies (see above). The exploration program, called the *Crevice Tunnel Project*, would be conducted by TVX Mineral Hill Mine and its authorized contractors under authority of Exploration License No. 00559, should this proposed amendment to that license be approved by DSL.

As the reader may recall, an underground exploration program was proposed by TVX Mineral Hill Mine's predecessors, American Copper & Nickel Company/Jardine Joint Venture in May of 1993. That program, which consisted of rehabilitating and extending an existing old adit located directly at Crevice Mountain (the First Chance Portal), was discussed at a public meeting held in Gardiner on 25 May 1993 and subsequently analyzed in an Environmental Assessment dated 9 August 1993. Although DSL was ready to approve that proposal pending agreement on mitigation stipulations and receipt of the reclamation bond, the company tabled the proposal. The mine and exploration properties were subsequently sold to the present owners. The currently-proposed Crevice Tunnel Project is designed as a low-impact program, specifically intended to address and eliminate all potential environmental impacts and public safety concerns which could result from portal construction right at Crevice Mountain, with associated surface haulage to and from Mineral Hill.

Spanning approximately 24 months, the project would result in a total of about 2.3 acres of new surface disturbance at Mineral Hill. There would be **no** disturbances at Crevice Mountain under this proposal. The tunnel would be driven southeast on a nominal +0.5% grade (incline) approximately thirteen thousand (13,000) feet from a new portal at the top of Mineral Hill. Development (waste) rock from the tunnel would be used on demand as fill in the Mineral Hill Mine, with excess rock placed in temporary storage on a pad near the portal. Rock that is not consumed as fill in the current Mineral Hill Mine operation would be backfilled into the tunnel upon completion of the project.

The tunnel would access the Conrad Zone at its lower limit, as determined by current surface diamond drilling (previously permitted by DSL), and would provide footing for underground diamond drilling, bulk ore sampling, and possible subsequent mine development. It should be noted here, however, that no mining plans exist at the present time; the proposed Crevice Tunnel is one component of an exploration program intended to determine the continuity of the potential ore body and to attempt to delineate an economic ore reserve in the Crevice Mountain area. If a minable reserve is identified at Crevice, TVX Mineral Hill Mine would be required to apply to DSL for an amendment to Operating Permit No. 00100 prior to commencing full-scale mining, addressing all issues pertinent to commissioning a satellite ore body. Under an exploration license, a company may only extract a maximum bulk sample of 10,000 short-tons of ore for use in metallurgical testing *(see 82-4-303(9) MCA)*.

2.0 LOCATION & ACCESS

The Crevice Tunnel Portal would be located near the top of Mineral Hill, within the Mineral Hill Mine Operating Permit area, entirely on patented (private), mine-owned ground: Section 9, T9S, R9E, southern Park County, Montana. The tunnel would run at depth under unpatented claims held by MHM to the patented Crevice claim block.

The project would be accessed exclusively by existing, permitted travel routes, principally private mine roads.

3.0 GENERAL PROJECT DESCRIPTION

The project comprises collaring a portal at the 7500-foot elevation near the top of Mineral Hill and driving a nominal 13-foot-high by 12-foot-wide tunnel approximately 13,000 feet southeast to the Conrad Zone at Crevice. The tunnel would be constructed on a nominal +0.5% grade to accommodate track haulage. As previously mentioned, development (inert waste) rock would be fed to the Mineral Hill Mine on demand as back-fill material (via the existing fill raise). Rock exceeding the mine's fill demand would be placed in temporary storage on a pad near the proposed portal. In the plan of operations, a small ventilation raise was proposed to be located on the Haviland patented claim. However, MHM's mine engineering staff now concludes that a ventilation raise would not be necessary along the route of the proposed tunnel drive.

New surface disturbance, totalling about 2.3 acres, would be confined to patented land as follows: 1) the proposed portal area near the top of Mineral Hill, including new road, sediment ponds,

and topsoil stockpile - 1.5 acres, and 2) the spur power line corridor on Mineral Hill - 0.8 acres. A one-acre secondary rock storage area, if needed, would be located on previously-disturbed ground between the proposed portal and the existing fill raise, and is not included in the 2.3 acre total. Reclamation of this presently disturbed area is currently bonded and covered under the company's current mine reclamation plan under Operating Permit No. 00100. The placement of development rock on this presently disturbed area under this proposed tunnel plan would require that additional bond be held under Exploration License No. 00559 to cover the additional reclamation costs associated with the storage dump.

3.1 ADDITIONAL PROJECT COMPONENTS

The project would include the following additional components:

-> Doze, stockpile and seed all topsoil from areas to be disturbed. Based on Jardine Joint Venture baseline soil surveys (Western Technology and Engineering, Inc., 1983), approximately 12" of topsoil (estimated at 2400 yd^3) would be salvaged from the 1.5 acre portal site for use in site reclamation.

-> Construct approximately 300 feet of new road, with a nominal 16-foot width. This road segment would be constructed from the proposed portal area to existing Mineral Hill roads. Otherwise, the project would be served entirely by existing, private roads up Mineral Hill.

-> Establish a temporary rock storage pad on the track siding near the portal. The pad would be located within the above 1.5 acre portal area. A secondary (contingency) rock storage area of about one acre would be prepared, if necessary, approximately 300 feet southwest of the portal on previously disturbed ground.

-> Install a cold storage/maintenance building (approximately 30 feet x 50 feet) proximal to the portal, within the above 1.5-acre area.

Portable powder and cap magazines (one each), would be temporarily located at safe distances from all other facilities and the portal, in compliance with federal Mine Safety and Health Administration (MSHA) regulations. Within about 4 - 5 weeks after project start-up, powder and caps would be placed in underground storage, and surface magazines would be eliminated.

-> Construct an approximately 3500-foot long overhead power line spur up the west slope of Mineral Hill from the existing Jardine electric power substation to the proposed portal site.

The power line corridor would be routed entirely on private mine property up the west side of Mineral Hill. Where it is necessary to clear trees or limbs from the corridor, clearing would be limited to 15 feet either side of the center line. The power line spur has been designed to traverse previously disturbed ground and existing roads to the maximum extent practical. Only about 1200 feet of the 3500-foot line would be on newly-disturbed ground. Construction of the spur line would not involve significant excavation or soil disturbance. If necessary, disturbed areas within the corridor would be seeded immediately following line construction. A power substation (about 20 feet x 20 feet) would be located within the 1.5 acre portal area.

3.2 PROJECT SERVICES

3.21 ***Water*** - Potable water for the project would be supplied by the existing MHM drinking water system, previously permitted by the state Water Quality Bureau. Process water for the project would be supplied through the existing mine system, as needed, and recycled through a closed-loop circuit.

3.22 ***Sewage*** - All project-related sewage would be handled through Mineral Hill Mine's existing, permitted system.

3.23 ***Garbage & Solid Waste*** - Mineral Hill Mine's standard operating policy would apply; i.e. domestic garbage would be bagged and stored in existing latching steel, bear-proof containers, for twice-weekly pick-up by the mine's contract garbage service. Solid waste - e.g., lumber and steel scrap - would be segregated for recycling, as practical, or disposed of in accordance with applicable regulations. No garbage would be allowed to accumulate on site.

3.24 ***Housing*** - No change in the permanent workforce would result from the project; therefore, no new housing would be constructed on, or mobilized to, the mine property.

3.25 ***Fuels & Lubricants*** - Fuels and lubricants would be supplied by a local vendor. A 2000-gallon above-

ground fuel tank, provided with spill containment capacity, would be located at a safe distance from other facilities, adjacent to the portal. A 6000-gallon propane tank would be likewise located within the portal construction area. All project lubricants would be stored in the portal storage shed and provided with spill/drip containment. Used oil would be sampled, stored and shipped per standard operating procedure through the mine's existing used-oil recycling program.

3.26 Emergency Services - Emergency services, including fire-fighting, medical, and mine rescue, would be supplied per TVX Mineral Hill Mine standard operating procedure, as discussed in its mine operating permit.

4.0 DEVELOPMENT ROCK HANDLING

Backfill material for Mineral Hill Mine is currently excavated from the tailings impoundment area (in preparation for annual phased construction of the impoundment), and trucked to the fill raise at the top of Mineral Hill. The mine consumes up to 110,000 tons of fill per year. Approximately 200,000 tons of development rock would be mined during the two-year Crevice Tunnel Project. Rock would be removed from the tunnel via track haulage, and fed on demand into the existing fill raise. If development rock volume temporarily exceeds mine backfill demand, storage would be provided on a prepared pad within the portal area, or on the secondary storage area to the southwest. All development rock would ultimately be backfilled into Mineral Hill Mine or into the tunnel itself.

To the extent that tunnel rock temporarily replaces pit-run material as backfill feed, the bottom configuration of the tailings impoundment would be modified. However, there would be no changes to the ultimate permitted design and operational criteria for the tailings impoundment.

5.0 WATER MANAGEMENT & CONTROL

Little groundwater in-flow to the tunnel is anticipated. If or when water is intersected, best available control technology would be employed at the source. Mine process water would be contained in a closed-loop circuit and recycled. Ditches and berms up-slope of the disturbed area at the portal would be constructed to divert surface run-on, and down-slope ditches would collect run-off and route it to a sediment collection pond. Disturbed areas would be revegetated with approved seed mixtures immediately after construction is complete.

5.1 GROUNDWATER

Existing information on the geology and hydrology of the Mineral Hill and Crevice areas was used by MHM technical consultants to model hydrogeologic conditions in the proposed tunnel. A MODFLOW model ("Modular Three-Dimensional Finite-Difference Ground-Water Flow Model," U.S.G.S., 1988) was very conservatively constructed. In its report on modeling results (available for review at DSL & MHM), despite assuming no inflow source control (a worst-case scenario that is **not** proposed), Huntingdon Engineering and Environmental, Inc. (June 1994) concluded that little water would be encountered in the tunnel (from about 20 to 66 gallons per minute). This conclusion is strongly supported by several years of experience with the underground workings at Mineral Hill.

TVX Mineral Hill Mine has committed to controlling groundwater inflow by applying the best available technologies appropriate to specific conditions if inflow water is encountered, including proven hole plugging and grouting techniques. If encountered, water in the tunnel would be managed as follows:

-> Drill "pilot" holes ahead of the advancing tunnel to provide predictive capability;

-> Grout inflows, if encountered, with materials and techniques appropriate to ground conditions;

-> Store mine water in sumps, and recycle through the existing Mineral Hill Mine water-handling system. Sumps would be located at 800-foot intervals along the advancing tunnel.

5.2 SURFACE WATER

5.21 Stormwater - Stormwater would be managed as follows:

-> Construct run-on diversion ditches up-slope, and run-off collection ditches down-slope of all disturbed areas;

-> Construct sediment collection sump capacity below disturbed areas, to which collection ditches would be routed. The pond(s) would be constructed to accommodate the 100-year, 24-hour precipitation event for the 1.5 acre disturbed portal area;

-> To minimize and control erosion, revegetate all disturbed areas as soon as possible, with seeding to begin immediately after construction is complete. Install erosion-control matting, if necessary, for interim stabilization.

-> Best management sediment control and erosion minimization practices would be employed throughout.

5.22 ***Palmer Creek*** - The proposed tunnel would be driven beneath Palmer Creek (the only perennial stream along the proposed drive direction) at or near a right angle to the creek, and at a depth of about 220 feet. In regards to the potential for impacts on flows in Palmer Creek, the Huntingdon hydrogeological report concludes that the tunnel drive would not measurably reduce surface water flow.

Under the most conservative modeling conditions, baseflow in Palmer Creek was calculated to decrease by as much as 8% over a 100-year time period. However, this requires that the overall hydraulic conductivity of bedrock within the Palmer Creek drainage basin is on the order of 0.01 feet per day and the hydraulic conductivity of the bedrock does *not* decrease with depth. One of the most characteristic features of the permeability of fractured bedrock, as is found in this area, is the general trend of permeability decreasing with depth. Fractures tend to close at depth because of vertical and lateral stresses imposed by overburden loads and locked-in horizontal stresses of tectonic origin. As an added precaution, however, MHM has formally agreed to set up a permanent flow measuring device and recorder at Palmer Creek to monitor its flow rates over time.

5.3 WATER QUALITY MONITORING

In addition to TVX Mineral Hill Mine's extensive water quality monitoring network already in place as required by its various permits, water encountered in driving the tunnel, and local surface water and groundwater would be sampled and analyzed for comparison to baseline and current operational monitoring results. Specific parameters to be monitored and their associated monitoring frequency are given in Appendix 3 of the plan of operations, copies of which are available for review at DSL or MHM. The monitoring program has been reviewed and approved by DSL's staff hydrologists.

5.4 ACID ROCK DRAINAGE

Despite over 100 years of mining in the district, including historic mines at Mineral Hill and Crevice, years of operational water quality monitoring have yielded no evidence of acid rock drainage. Although sulfide-bearing mineralogies have long been exposed to water and air in historic workings, analytical results of on-going water quality sampling at the 1300-level portal (Mineral Hill area), driven in about 1910, and at the First Chance portal (Crevice area), driven in 1890, show pH values neutral or slightly alkaline, with low sulfate concentrations. These two historic mines, essentially functioning as long-term kinetic test sites, serve as the best possible predictors of the long-term acid-producing potential of run-of-mine rock in the area.

In the February 1994 report on a 12-month baseline water quality study, Chen-Northern, Inc. concluded: "Analytical results show that water from adits generally is a good quality calcium-bicarbonate type with a neutral to slightly alkaline pH (6.0 - 7.7 s.u.). There is no evidence of acid mine drainage from any adits observed in the study area. ... Concentrations of sulfate (4 to 10 mg/l) are low and the water is soft (14 to 39 mg/l hardness as $CaCO_3$)." ("Water Resources Baseline Investigation for the Crevice Mine Project, Park County, Montana," Chen-Northern, Inc., 2/94)

Because there are no indications of acid rock drainage at active or historic mines in the district, it is anticipated that no acid rock drainage would result from the proposed project. Regular water quality sampling would be conducted to test and confirm this postulate. In addition, should the tunnel drive encounter any unfamiliar rock lithologies (i.e., rock types that have not been encountered and extensively sampled elsewhere on the Mineral Hill or Crevice properties), these rock types would be evaluated for acid generating potential, and a rock management plan drafted for subsequent review and approval by DSL.

6.0 RECLAMATION

As discussed earlier, the proposed Crevice Tunnel is one component of an exploration program intended to delineate an economic ore reserve in the Crevice Mountain area. If a minable reserve is identified at Crevice, MHM would apply for an amendment to Operating Permit No. 00100, addressing all issues, including permanent reclamation, pertinent to commissioning a satellite mine. The Montana Metal Mine Reclamation Act and associated regulations provide that all exploration plans of operation approved in and by the State of Montana contain a permanent rec-

lamation plan that conforms to all current regulatory standards and practices. All exploration projects must be fully bonded for reclamation prior to any disturbances taking place. These requirements apply regardless of the potential for later mine development.

However, the Act also allows for postponement of the reclamation requirements under an exploration license if: 1) the operator applies for an operating (mining) permit, or amendment to an existing mining permit, and 2) the exploration disturbances are addressed under the pending mine permit reclamation plan (see 82-4-332(4) MCA). In a case such as this, the exploration reclamation plan and bond would remain in full effect until such time that a mining permit was granted (covering the reclamation of the disturbances under a new plan and bond); if the mining permit or amendment was denied, the site would be fully reclaimed as per the exploration reclamation plan. In all other cases, reclamation must occur within two (2) years of project abandonment or completion, or DSL would forfeit the bond and perform the required reclamation.

If the exploration program does not identify a minable ore reserve, MHM proposes to begin project reclamation immediately following completion of exploration activities, and would proceed as follows:

-> All facilities would be removed from the proposed portal area.

-> All associated road segments would be pulled back to the original contour.

-> The power line spur would be dismantled and removed, and the corridor permanently revegetated. (Using the seed mixture specified in the approved, existing reclamation plan for this habitat type, the corridor would be revegetated immediately following construction, if necessary, as discussed earlier. This may obviate the need for extensive reseeding at the time of final project reclamation.)

-> The concrete pad under the storage shed would be broken up and buried as fill in the portal area.

-> The tunnel would be backfilled under the Bald Mountain Road, and the portal sealed, as appropriate.

-> The portal area would be restored to approximate original contour.

-> Topsoil would be redistributed over the regraded portal disturbance area, and the site revegetated with seed as specified in the approved MHM reclamation plan.

7.0 MITIGATING MEASURES

TVX Mineral Hill Mine, in its proposed plan of operations, has stated that it is committing to driving underground to Crevice specifically to avoid potentially negative environmental impacts associated with the surface alternative. Selection of the underground tunnelling alternative is, itself, an overriding impact mitigation. Tunnel access virtually eliminates the potential for impacts to nearly every resource value:

-> cultural resources
-> soils
-> vegetation
-> aquatics
-> fisheries
-> wildlife
-> threatened and endangered species
-> public recreation
-> other public land use (e.g. firewood cutting, hunting, logging)

Impacts to scenic, visual, and aesthetic values would be greatly reduced, and would be limited to the negligible effects of a well-designed, located and constructed portal on Mineral Hill, an area already impacted (as permitted) by frequent, year-round operational traffic and previous surface disturbance. Underground access would eliminate vehicular conflict on public roads, increase employee safety (by eliminating year-round surface haulage over a long distance on high elevation, steep-gradient mountain roads) and eliminate the noise and lights of 24-hour, year-round truck haulage. Finally, because underground access to Crevice eliminates all significant impacts to surface resources, the proposed project would not add to the cumulative impacts of all existing and future uses on public (National Forest) lands.

Mineral Hill Mine has committed to adhering to all pertinent fire prevention and burning regulations, and applying best management practices regarding fire safety. No open fires would be permitted. Chain saws and other portable gas-powered equipment would be equipped with approved spark arresters. Fire extinguishers would be kept on site and in good working order at all times. Hand tools, pumps, water and earth-moving machinery would be available at the site for fire control.

Specific mitigations proposed for various resources and concerns are discussed in greater detail below.

7.1 AIR QUALITY

A professional consultant was retained by MHM to perform an air quality inventory, and to determine the need for an additional air quality permit. This inventory concluded that any new emissions would be so low that they would not even approach the threshold values, above which an air quality permit would be required. Nonetheless, MHM has committed to extending current mine-area air quality mitigations to the Crevice Tunnel project area, including surface road dust control and wetting of rock piles.

7.2 WATER QUALITY

Based on very conservative state-of-the-art modelling, Crevice area surface exploration drilling, and the history of mining at Mineral Hill, it is anticipated that little water would be encountered in driving the tunnel. Underground water inflow to the tunnel would be controlled at the source. Sumps would be used to store and recycle mine water. Fugitive oils (sheen or film), if any, would be skimmed from sumps regularly. No water would be permitted to discharge from the portal. If, following project completion, long-term flow appears likely, an appropriate portal plug would be installed.

Construction and operations activities would be managed as previously discussed to prevent negative impacts to surface waters. No discharge to surface waters would be permitted. MODFLOW modelling also predicted no measurable impact to Palmer Creek or other surface waters.

Substantial analytical and qualitative evidence demonstrates that known lithologic units and mineralogies do not generate acid rock drainage. If rock types are intersected which have not been previously encountered, each unit or type would be evaluated for acid generating potential, and a rock management plan drafted for subsequent approval by DSL.

Sewage would be treated through the existing, permitted septic system. Water quality and quantity would be monitored regularly, and results reported to DSL. DSL would also periodically take its own check samples to compare with MHM's water quality test results.

7.3 FUEL & LUBRICANT STORAGE

Diesel fuel would be stored in an above-ground tank provided with spill containment capacity. Propane would also be stored in an approved above-ground tank. No buried tanks would be permitted. Regular inspections would be made by

both MHM and DSL to ensure that tanks, hoses and nozzles are in good condition, and that there are no leaks.

Lubricant inventories would be provided with secondary spill/drip containment capacity. Provisions of the MHM Spill Prevention, Control and Countermeasure Plan (already in place at the mine) would apply to this project.

Oil/fuel-absorbing materials would be kept on site and in stock at the MHM warehouse in the event of minor leaks or spills. MHM has committed to adhering to all applicable regulations and best management practices with regard to handling and use of fuels.

7.4 NOXIOUS WEED CONTROL

The provisions of MHM's weed control program would apply to the Crevice Tunnel Project. To prevent introduction of weed seed, all mobile equipment and vehicles would be thoroughly washed at an off-site location, or in a controlled area at the site, and inspected by the MHM Environmental Department prior to mobilizing onto the project. Equipment or vehicles which leave the site during the project must be re-washed and re-inspected before re-deployment on the site. No hay or straw would be permitted on mine property unless specified for an identified need and certified weed-free. MHM currently surveys and treats the entire mine property regularly for weeds.

7.5 TRANSPORTATION

All surface transportation to and from the portal and vent raise sites would be by existing, private mine roads. Traffic would be minimized by using multi-passenger vehicles and coordinating supply trips.

Development rock from the tunnel drive would be hauled from the mining face to the surface by underground train. To the extent that tunnel rock replaces pit-run fill material (from the tailings impoundment) as mine fill at the Mineral Hill Mine, truck haulage up Mineral Hill would also be dramatically reduced or eliminated for the duration of this project.

7.6 NOISE

Noise levels associated with the project would be significantly lower than for the surface haulage (from Crevice) alternative. Noise levels during construction of the portal may temporarily exceed current operational levels. However, within 30 days of Project start-up, noise would drop sub-

stantially below current operational levels, as the tunnel construction activities proceed underground, and as development rock replaces backfill material hauled by truck from the tailings impoundment area.

7.7 SOCIOECONOMICS

MHM would contract approximately 30 temporary workers for the duration of the exploration project. To the extent practical, workers would be hired from the local labor pool. The temporary workforce would have a short-term positive impact on the local economy, as their relatively-high wages infuse various markets. No additional housing would be built in, nor mobilized to, Jardine in connection with this project.

7.8 WILDLIFE

All appropriate measures would be taken to avoid negative impacts to or conflict with wildlife. Current mine policy provides that: 1) no firearms are or would be permitted on company property; 2) no pets would be permitted on the project site; 3) all foods or other potential bear attractants would be secured at all times, and garbage secured in bear-proof containers; and 4) sightings and sign of wildlife would be reported to supervisory personnel and recorded on standard MHM wildlife observation forms.

As with all other power lines associated with the Mineral Hill Mine, the proposed power line spur would be constructed to raptor-proof specifications to avoid injury to or loss of raptors or owls. To minimize even short-term loss of wildlife habitat, land disturbed during construction would be re-seeded immediately upon completion of construction.

The portal area at the top of Mineral Hill would require disturbance of about a half-acre of meadow which does have some wildlife value. However, there is nothing unique about this area and many other similar sites exist on Mineral Hill.

7.9 STABILITY & SUBSIDENCE

As with all underground proposals, concerns are raised regarding the potential for subsidence to the extent that such an event would impact surface resources. As a general rule, the potential for surface expressions as the result of underground subsidence greatly decreases with tunnel depth. Engineering studies for this proposal have shown that this potential only exists for the first 225-250 feet of tunnel (from the portal inward). This section is also the section

that goes beneath the Bald Mountain Road (USFS Road No. 6945). Because of this, MHM is proposing to use steel sets on 2-foot centers and reinforced concrete in the first 250 feet of the tunnel to enhance stability. This mitigation virtually eliminates the possibility that any subsidence would occur.

8.0 ALTERNATIVES

As discussed earlier, an underground exploration program was proposed by TVX Mineral Hill Mine's predecessors, American Copper & Nickel Company/Jardine Joint Venture in May of 1993. That program, which consisted of rehabilitating and extending an existing old adit located directly at Crevice Mountain (the First Chance portal), was discussed at a public meeting held in Gardiner on 25 May 1993 and subsequently analyzed in an environmental assessment dated 9 August 1993. The company tabled this proposal, and the mine/exploration property subsequently changed ownership. The current owners reviewed the pros and cons of siting an exploration portal right at Crevice, and decided that the overriding negative impacts of surface transportation and haulage to and from Crevice Mountain justified the added expense associated with this new tunnel proposal. In essence, the company already examined two major siting alternatives prior to submitting the Crevice Tunnel plan of operations.

Since submitting the current plan of operations, MHM has seriously examined an additional alternative. Instead of siting the Crevice Tunnel portal on the top of Mineral Hill, the company has examined the feasibility and consequences of locating the portal and associated disturbances (as discussed in this EA) at the existing, 600-level portal area ("600-level" means the portal is located approximately 600 vertical feet down from the top of Mineral Hill). The 600-level portal was driven and periodically worked in the first half of this century, but has never been used by the Mineral Hill Mine except for ventilation and as an additional escapeway for mine employees. This existing portal is considered unsuitable from an engineering and safety standpoint for use as the portal for the proposed Crevice Tunnel. As such, MHM is considering driving a new tunnel with the portal to be located adjacent to the existing 600-level portal, all within the existing, historic 600-level portal disturbance area.

Under this alternative location, most of the analysis presented in this EA applies, since siting the portal of the Crevice Tunnel at the 600-level area would not change the bearing of the tunnel drive examined herein. It would still be entirely on private land and accessed entirely by private mine roads, no raise would be required along the tunnel drive route, and it would still be driven at a +0.5% grade (incline). The depth of the tunnel, of

course, would increase proportionally, and the tunnel would access the target ore zone from a point below the known extent of the zone. However, this would further alleviate any concerns, however minor, under the current proposal regarding any potential for surface subsidence and impacts to Palmer Creek (see Sections 5.22 and 7.9 of this document). Another difference under the 600-level alternative important to note here is the elimination of an as-yet unknown amount of overall new surface disturbance, primarily due to the elimination of the need for a new powerline corridor on Mineral Hill. If the Crevice Tunnel portal area is relocated under an amendment to the 600-level area, MHM could run power from the existing substation at the mill into the 1030 (production) portal and underground to the 600-level area. As the proposed powerline corridor under the current proposal was the primary visual impact of this project, switching to the 600-level alternative eliminates this impact. Other minor advantages of the 600-level alternative is that the need to disturb about a half-acre of a relatively level meadow area at the top of Mineral Hill would be eliminated. Although there is nothing unique about this area, it does appear to have a higher wildlife value than the minor new disturbance that would be required at the 600-level area. Also, the need to drive the tunnel beneath a public road, as is currently proposed, would be eliminated under the 600-level alternative.

Based upon what is known thus far regarding this alternative, there would be **no** additional adverse environmental impacts associated with the 600-level portal site; it appears at this time that adoption of this alternative would only yield an environmentally-superior project. Therefore, at this point, DSL considers the 600-level scenario to be the preferred alternative. However, since this determination has been made based on preliminary information, it is subject to change when and if this proposal is finalized and formally submitted to DSL. Should this alternative be formally proposed as an amendment by MHM, the alternative proposal would be examined in detail at that time by agency specialists, and a determination would be made regarding the extent of further environmental analysis.

9.0 OTHER PERMITS REQUIRED

The need to submit an application for an air quality permit has been examined by MHM's air quality consultant, and a negative determination has been made. The state Water Quality Bureau is currently reviewing the status of MHM's stormwater permit to see if any modifications are necessary under this proposal. No federal permits or actions are required. Therefore, with the possible exception of an amendment to the existing stormwater permit, no other permits are known to be required for this operation.

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